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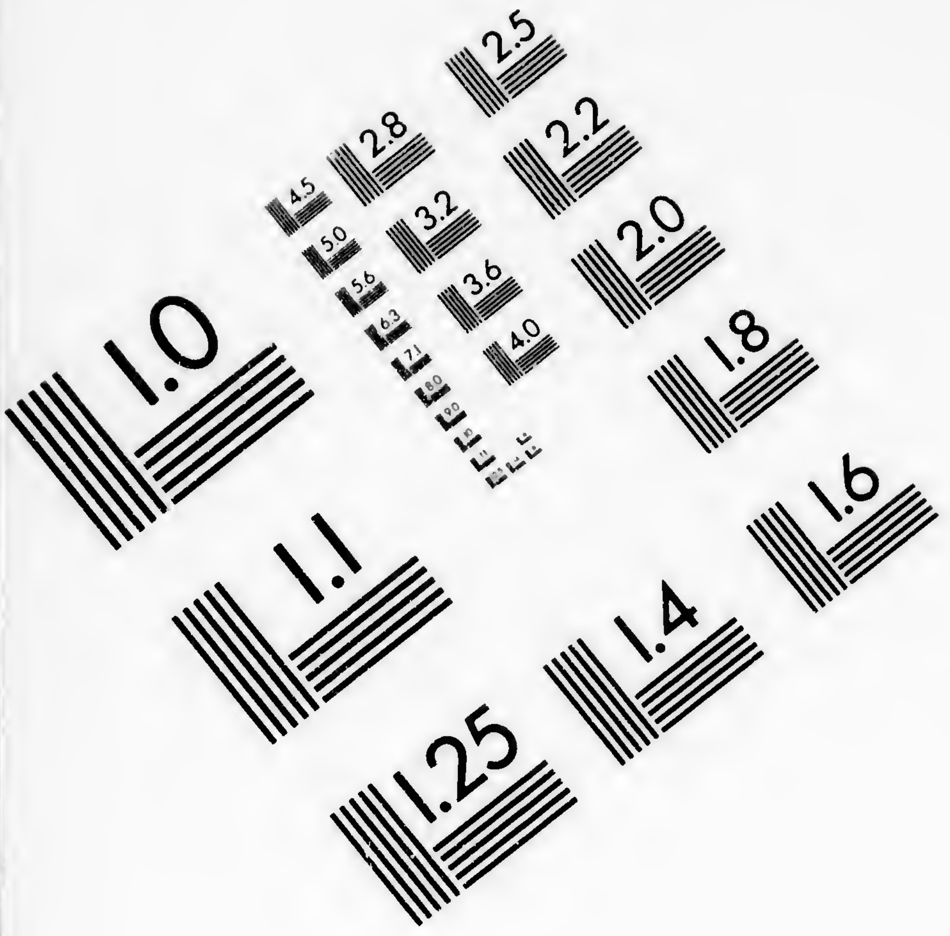

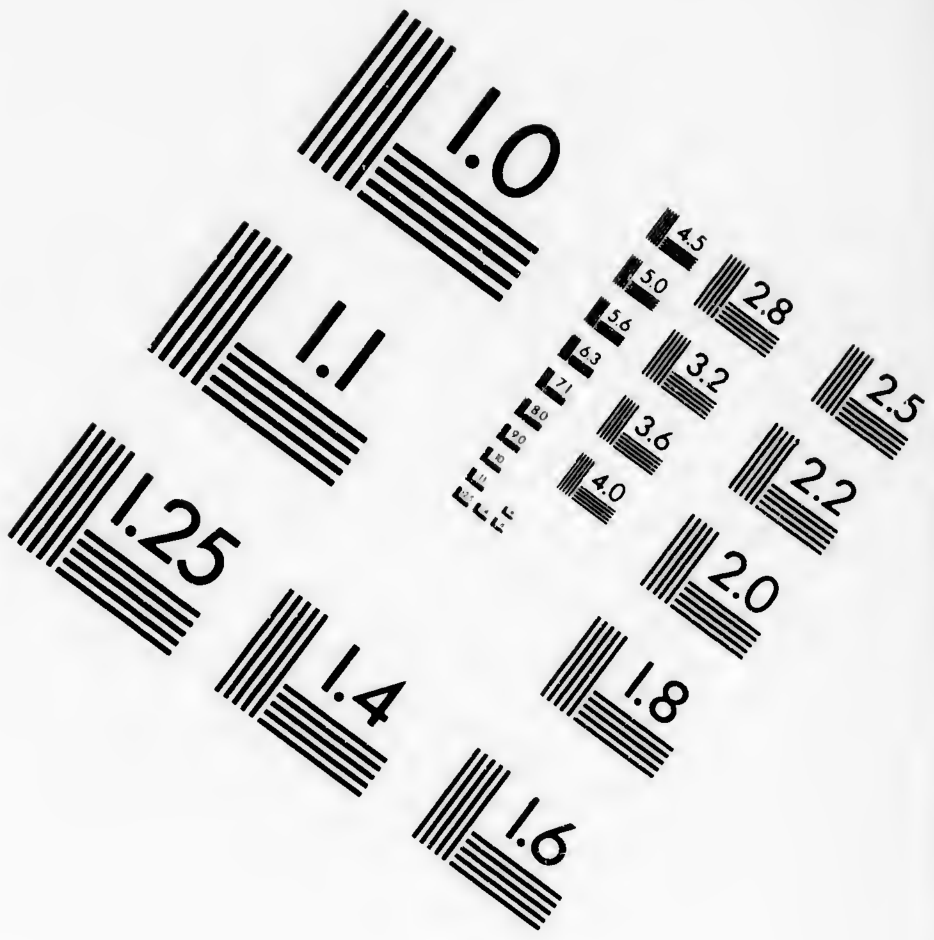

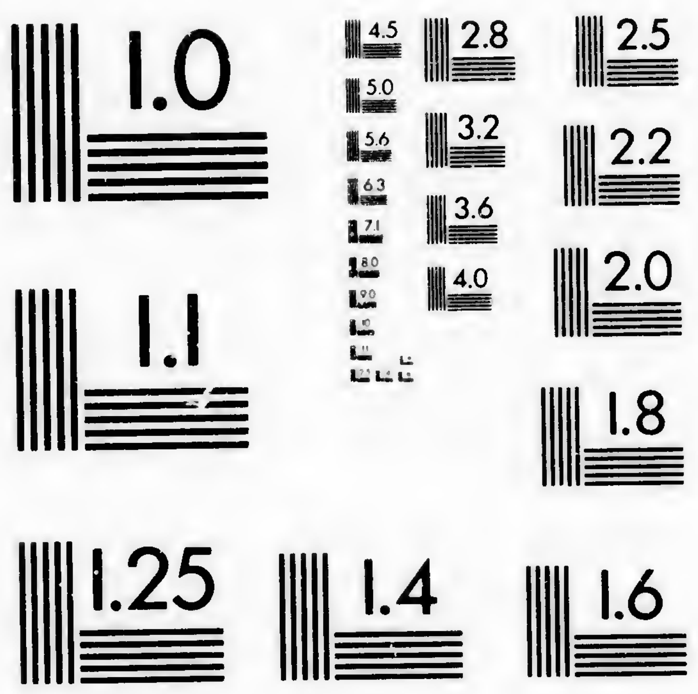

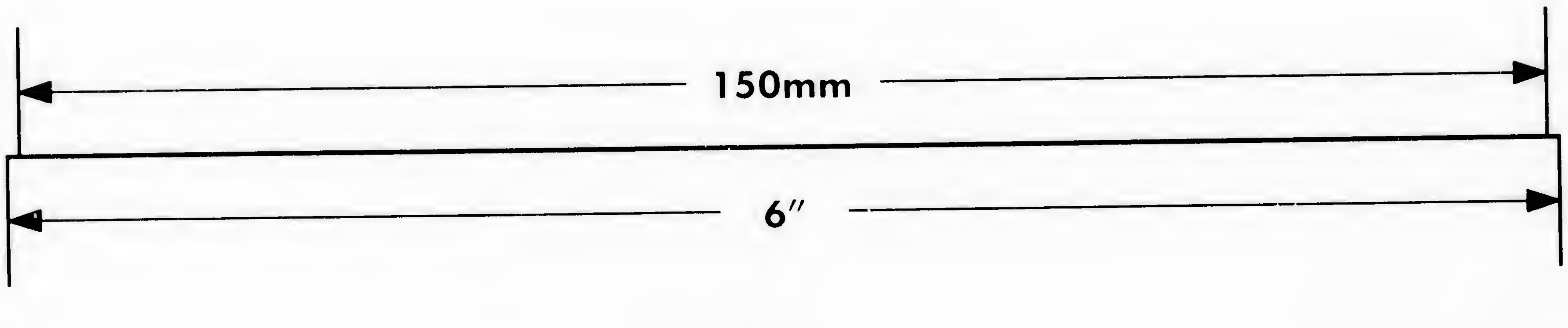

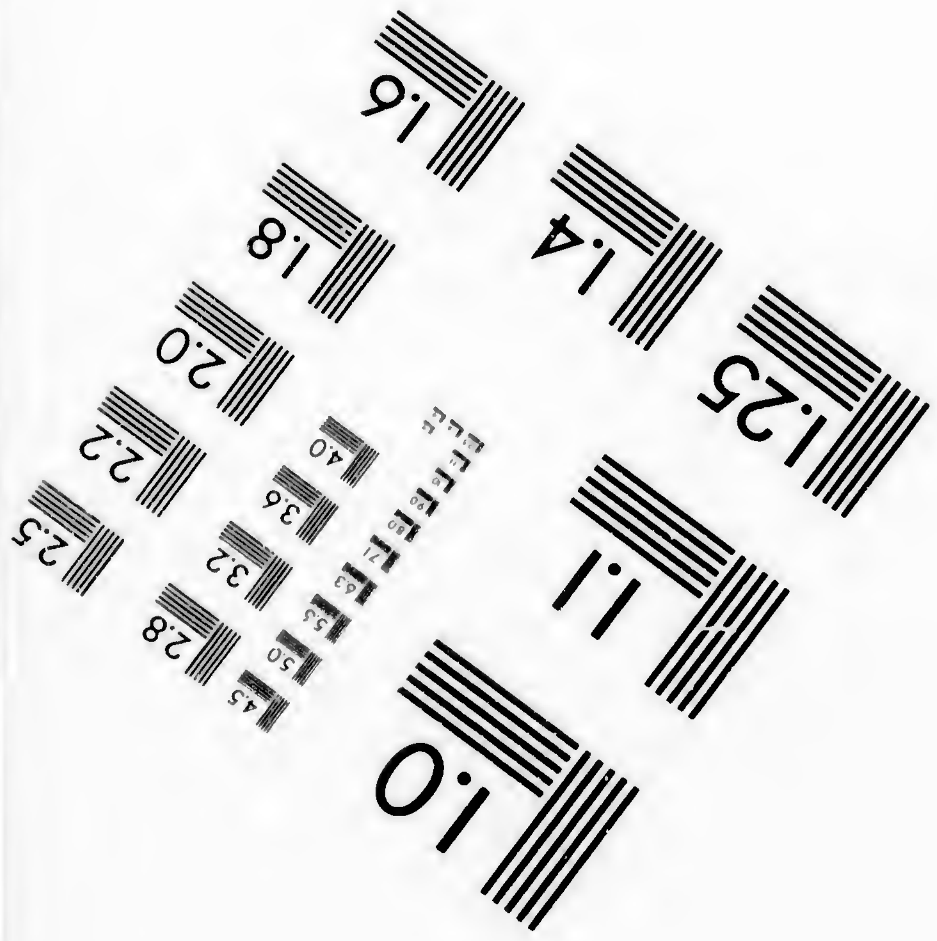

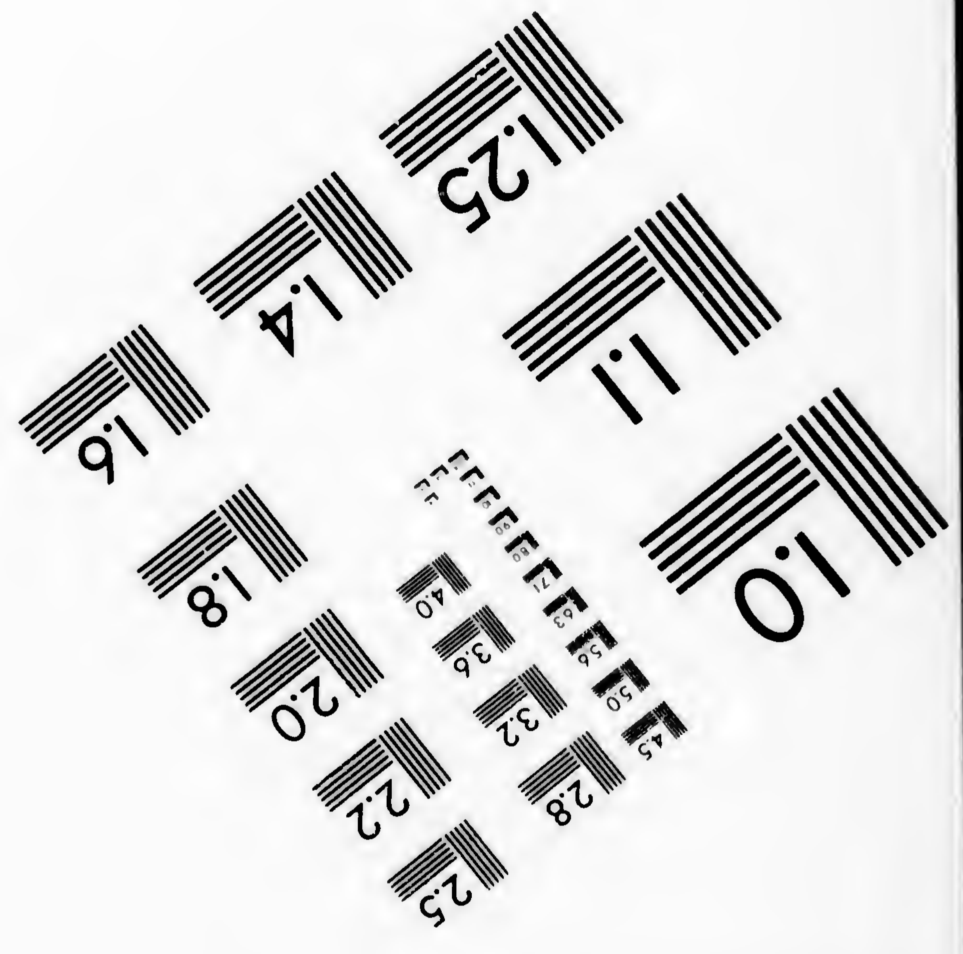

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THE PRACTICAL DITCHER.

A TREATISE ON RECLAIMING WET AND
SWAMPY LAND, AND IMPROVING MOIST
AND WET SPOTS OF LAND UNDER
CULTIVATION, BY OPEN
AND COVERED
DITCHES.

BY J. S. KELLER,

Orwigsburg, Schuylkill County, Pa.

HENRY L. ACKER, PRINTER,
POTTSVILLE, PA.

1859.

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TO THE READER.

THAT a plain and practical treatise on the subject of improving wet land by ditching, is demanded by the farmers of the present progressive age of improvements, is evident, from the fact, that the large quantity of land met with in the thickly settled districts still in its unimproved condition for want of a proper acquaintance with correct principles to accomplish this much desired object.

The author flatters himself, that he here offers a practical work, small and cheap, embracing most, if not all the leading information on the subject of draining, the practical agriculturist stands in need of. He claims no literary merit for this work ; using language and style easily understood by the most common and uneducated . being himself an humble, practical cultivator of the soil, and having experienced all he is writing about : and has with his own hands performed all kinds of farm labor, and among it, open and blind ditching has occupied much of his time and attention.

J. S. KELLER.

ORWIGSBURG, JULY 1, 1859.

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CHAPTER I.

THE BENEFIT OF DITCHING CONSIDERED.

I. All who have made it their habit, to make observations during their labors and wanderings, on wet, moist or swampy and marshy land, must be forcibly impressed of the necessity of improving those neglected acres, whose surface has been subject to be covered either continually or temporary with large quantities of water, or where the soil is for a portion of the year so saturated by water that it is unfit for cultivation. Such ground I have always found to be the most productive after a judicious course of draining has been applied; from the fact, that the soil becomes dry and sweet, and that the vegetable matter decayed on it in many places for years, and even centuries, although for the most part unfit for animals to subsist upon, having been stored up in large quantities as organic matter for the benefit of future generations, who may take advantage of it after withdrawing the water and moisture. That organic matter has a powerful effect on useful and profitable crops, if the land is well limed and properly cultivated.

II. I have known farms that were deemed valueless for the reason that they were in too wet a condition or partially so, for profitable farming, and have been sold very low on that account, and I know of no kind of land in the old settled States, so profitable as the kind under consideration, if it can be purchased cheap. A careful and observing person must see, that after efficient draining has been applied, such lands will produce more summer grain and grass, and in most cases also winter grain, especially when a heavy dose of lime is spread over them, (say 100 or even 150 bushels to the acre than any soil in their vicinity.

III. It is certainly preferable to have such wet land, than the opposite extreme, on high and barren hills, of either a loose and very porous, or hard and extremely stony quality. For the former can at a much less expense be improved, and more permanently; while the latter, if ever improved, is at an enormous cost, and then it will last for a very short period only, and its improvement will require much harder labor than the former.

The question then presents itself. Why is this so? And the reply is, that a wet piece of ground can be permanently improved by ditching, deep plowing, and a good application of lime, and in some cases manure, and the soil well pulverized with a good sharp harrow; while the other would require a more frequent repetition of fertilizers, and in place of draining, it would require an inch or two of rich loam, or afterwards so made, to bring it in a conditiou to produce remunerating crops.—This immense labor in carting earth would be very costly.

IV. The author can point to ground reclaimed by his own hands, which he found at one time an immense mud-puddle, covered in some places with sour wiry grass, that no scythe would cut, and no anim ls eat, and all over it stood a rusty looking water, (Protoxite of Iron) which since its reclamation has yielded some of the finest crops of wheat, corn, potatoes, oats and timothy. The same ground would scarcely be known by one who saw it before, were it not for the surrounding unaltered locations. It is now sufficiently dry for all kinds of crops, of a deep and productive soil, and one of the best to retain fertilizers: and that has all been accomplished by blind ditching, deep plowing, a heavy coat of lime and some barn-yard manure.

V. The Middle and Eastern States have thousands of acres of land which might be made to smile in its cultivators face, by comparatively little expense, which now are no more than fever and ague nests. Instead of moving to the far West, to undergo a change of climate, and expose ourselves to the different diseases consequent on such a change of location; would it not be better to drain these wastes, and turn them into profitable fields? Here in the East, where we have a good market at our doors for all that we can produce, and always the highest prices, it is of immense importance to make proper use of every foot of land.

VI. In the drainage of land it will become necessary to make ourselves acquinted with the principles on which nature intended it should be done. 1. It is absolutely necessary to make and locate a ditch so as to carry off the water, if we only collect it in improperly made and located ditches to stagnate and become foul we gain no advantage at all, but in reality we lose. 2. Ditches should be sufficiently deep which must be determined from the different formations of strata (or layers) of earth we operate upon. Much of lost labor, and injudicious expenditure of money is frequently incurred by making ditches too shallow both open and blind. Nature has pointed out ways for all things, and they must be strictly followed, if any good is to result from our labor. I have seen a field of very heavy and stiff clay, on the side of rising ground, and water oozing out the whole length of the field, freshly plowed. and the deep furrows in the middle of the lands filled up with stones. This made the evil worse; it added to the already wet soil, stones to be rolled about the field by every implement that is put in the ground; thereby incommoding the after labor of the field, and leaving the ground as wet as it was before in every respect. All ditches, if calculated to benefit must be below the surface or tillable soil.

VII. Some have recommended the draining of dry land; that is a matter I will leave to such as believe in it, to demonstrate it by a practical result without either condemning or approving of such doctrine, believing that every man who has an opinion is entitled to at least some consideration. But I will continue to ditch the wet land first.

VIII. It will become indispensable to every one who begins to reclaim land by ditching, that he makes himself thoroughly acquainted with the nature of the different strata of ground which he intends to ditch. If one is not able to judge for himself from inexperience, it would be vastly to his advantage to pay a few dollars to employ a person who has the requisite knowledge in order to give him the understanding of the correct principles that accompany this useful branch of farm industry.—By a careful perusal of this little work, however, it is believed, that practical information enough will be imparted to enable almost any one to undertake the operation without fear of failing to accomplish its desired object.

IX. All observing farmers must have seen wet fields plowed for a number of years whenever their turn came, and sowed or planted with crops, which never paid for the labor bestowed thereon, whereas if the money and labor that two cultivations of such land cost its proprietor had been spent in properly draining it, it would have paid it in the

first crop and the timothy that followed. That farming such land without draining, is a wasteful business, I hope needs no argument to prove. And that the draining of such land is a benefit both as regards health and the increased produce must be equally clear to all who give the matter the least attention.

CHAPTER II.

WATER—ITS SOURCE—EFFECTS ON THE SOIL & THE CROPS.

I. It is not my object to enter into an Hydrological discussion, but I will merely mention facts connected with the subject of draining, necessary for the farmer to know, in order to assist him to accomplish his work to advantage.

By evaporation the atmosphere is charged with the water which supplies the wants of nature, either in the form of rain hail or snow, altogether depending on the temperature of the currents of air through which it passes in its descent. The process is simple and plain which nature has pointed out for the tranpositson of water: all the water that comes out of the earth falls from the clouds; and that which falls on hard and impenetrable surfaces, and the quantities which the earth cannot absorb as fast as it falls, passes off. swelling streams and creating floods ; while that which is absorbed in falling on porous and loose earth, sinks till it comes in contact with an impenetrable stratum on the top of which it flows till it finds an outlet in springs and wells from which we draw our supplies.

II. Thus the Creator has beautifully and economically made provisions for his creatures. He evaporates the water by a beautifully arranged system, forms clouds, and when the atmosphere is sufficiently charged with water, and in the proper condition, the contents of the clouds are deposited upon the earth, swelling the streams, and leaving at the same time a supply in the earth for the wants of man and animal which is obtained at the outlets and streams created.

Thus the same water passes through the Laboratory of Nature an endless number of times, and a man may in the course of his life, drink over more than once the same water which moistens his system, and that he may do on different parts of the Globe. Nature thus purifying some by filtration and charging some with saline ingredients contained in the earth ; some with calcarious matter, some with oxide

of iron, some with sulphur and various other mineral substances.

III. Springs that continue running during dry as well as wet seasons come from great distances in strata of earth, porous enough for the water to pass through, but on top of hard ones; the water may thus come thousands of miles, discharging water that falls on the ground in all that distance. That which falls close by is first discharged, that which falls further off succeeds, and before the last in the stratum is discharged, we may have another fall of rain, and the water will continue running, during both wet and dry seasons, without much apparent difference, increasing very little from rain, nor falling off much in dry seasons.

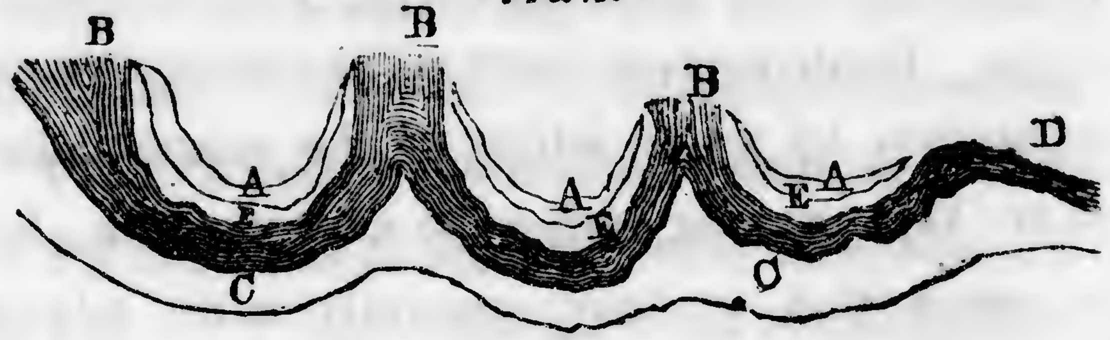
IV. Water always seeks its level. Springs that are found on tops of mountains, are supplied by water falling on still higher mountains, sinking in porous strata, between hard and impenetrable ones. till where an out cropping takes place or where another natural or artificial outlet is formed, it may thus come from a distance over valleys and hills.

V. Springs that become dry during the least drought, are supplied contiguous to where they are, and as soon as the water retained by the earth in that vicinity is discharged, they stop running till a soaking rain falls, when they will resume running again, and continue till the next dry spell of weather falls in. Temporary, or those called winter springs, are supplied by water falling on the nearest hills, and are kept running during the winter season, (for the reason that we have generally more falling weather during that season than in summer), and will cease running soon after the wet season is over and a warm sun comes on the ground.

VI. The reason that springs are more frequent near the foot of rising ground, or in vallies, is, that water which is not under an impenetrable stratum, will seek its outlet in those localities, from the fact, that the ground is not firm enough above it, to enable it to force its way up the next rising ground. If the water from the clouds, however, falls on ground of a loose and porous quality between two strata of hard and impenetrable ground or rock, it may be found forcing its way for thousands of miles, up and down hills till it finds an outlet, creating continual running springs during all seasons of the year as already said.

Figure 1, illustrates a section of earth containing a continual running spring.

FIG. 1.



A. A. A. Represents the surface earth. E. E. E. is the upper impenetrable stratum, broken by some subterraneous cause at the elevations B. B. B. B. where the porous stratum through which the water passes, crops out. C. C. represents the underlying impenetrable stratum the foundation for the water to pass over. The outlet is at D.

There may be springs in the valleys on the surface earth A. A. A. forcing their ways through small fissures of the under strata, and even large rivers might wind their course through those localities over and above those springs that come from a great distance. By digging or boring for water in some instances a large district might be supplied with valuable water. In this way artesian wells are made.

VII. Figure 2, illustrates a spring discharging water on a high mountain which has its source of supply still higher.

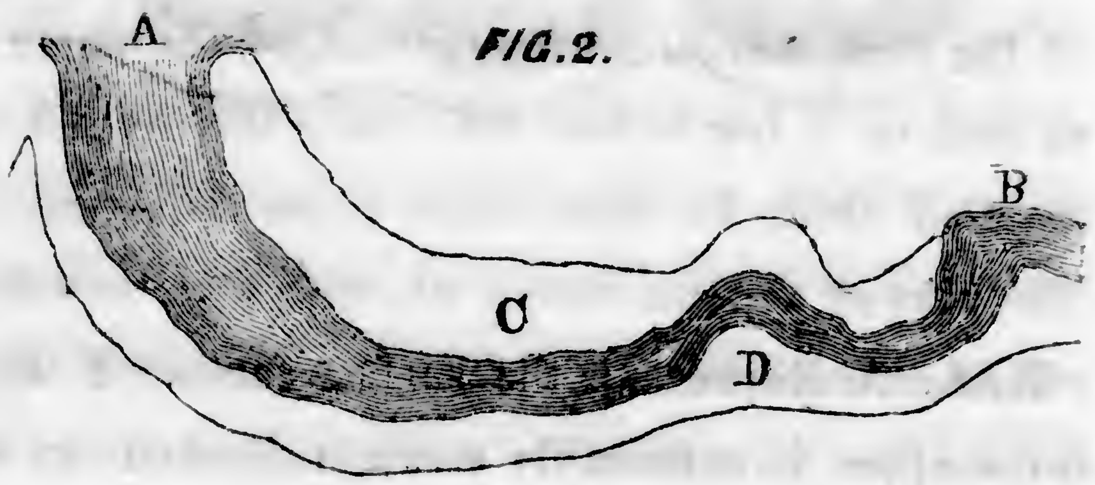


FIG.2.

A. The top of a mountain and source of supply, higher than the top of mountain B. where the spring discharges its water, when it may pass on the surface of the earth, and enter it again, as is sometimes the case, and reappear in the form of a spring in the valley below, and assume the character of a regular surface stream, or it may remain on the surface where it springs at B. and tumble down the precipice forming a mountain cataract, and finally empty itself into another stream in the valley and from thence into an ocean. During all this surface wandering more or

less evaporation takes place for future supplies. C. is a hard impenetrable strata, between which the porous statum cropping out at A. and B. and the conduit for the water lies. We will next consider the effects of water on the soil under cultivation.

VIII. Water if constantly, or for a large portion of the time stands on the surface of the earth, or an inch or a few below, will keep the ground too wet and chilly for cultivation to any advantage.— The rays of the sun cannot exercise their beneficial effects on such localities, from the fact, that before the surface is sufficiently warm, night falls in and assists the water to keep the soil wet and chilly: so that very few plants or trees of which we have much benefit will grow on such ground; excepting sour grass that makes manure, when used as litters or willow for basket work, and in some place; even they will not grow. Such localities are a total waste to its owner or cultivator, unless he adopts an effective and proper system of drainage. Even if plants can be started on such ground, they may grow till winter, when the frost will throw them out of the ground to die away, or what do remain, will be of a diminutive growth for want of solar and atmospheric influence on the earth and the roots of plants; the one is prevented to enter them by the cooling effect, and the other, because its communication to the roots is cut off by the water; whereas, a proper supply of water at suitable periods has a most beneficial and salutary effect on plants and trees; but that water is most advantageously obtained by a natural supply directly from the sky. It dissolves the organic matter in the ground, as well as the saline ingredients into a liquid ready for the little spongeoles to take up and convey to the growth of vegetation useful for the sustenance of man and animal.

IX. It will therefore become necessary for the farmer to examine his ground, and see whether he has none that would be benefited by ditching, which he will be able to see in a very short time after he becomes acquainted with the principles that govern water. The farmer possessing wet and marshy spots, will thus be enabled to put his ground, (otherwise unfit for cultivation) in the best condition in drawing the surplus water from the surface by a judicious and well studied system of draining, either by open or covered ditches, as may best suit his

convenience and judgment of which I will more fully speak in the following chapter, giving my own experience and approved suggestions.

CHAPTER III.

DRAINING AND ITS EFFECTS, BY A PRACTICAL ILLUSTRATION; BOTH BY OPEN AND BLIND DITCHING.

I. In order to draining to any advantage one must become acquainted with the true principles connected with it. Much money may be expended, and labor performed to no advantage, if the work is done in a careless and inexperienced manner.

II. The great object in view, is to reclaim land comparatively valueless in its natural state, which, artificially however can be made the most valuable of all in its vicinity. It is necessary to acquaint ourselves with the kind of ground we intend to drain, and its strata of clay, gravel or whatsoever it may be, and then the proper place to locate our ditches, is a subject which requires a great deal of judgment to accomplish the object properly.

III. Take for instance, the foot of a rising piece of ground, where we very frequently find temporary as well as continual springs oozing out, some forming little streams pass on emptying themselves into larger ones, while others appear on the surface spreading over a large area keeping the ground too wet the whole, or greater part of the year, for cultivation, or even for the use of profitable pasturing, and gradually the water is again lost in an out-cropping looser stratum of earth after having made barren the surface of several acres of otherwise very valuable ground for cultivation.

IV. An inexperienced person might begin operation on a field 100 perches long and 50 wide, and the upper part of the whole length of it having 20 or 25 springs or wet places keeping the ground wet and unfit for rural purposes, which might, however, be benefitted by ditching.

Now, were the occupant to make a ditch for every spring throughout the width of the field, it would be both an expensive and foolish piece of work.—The better plan would be to run a ditch along the foot of the rising ground, in a place where he might get all these springs into one drain, and if some are oozing out a little higher up the rise than others, let him keep low enough to cut off all the water from the lowest, and run a short branch to each of those a little higher up, and the one ditch of 100

perches, with a few small branches will accomplish what some inexperienced persons would accomplish by cutting 20 ditches, each of from 40 to 50 perches long.

V. Open ditches will carry off the water as effectually as covered, but they are a great inconvenience to the team and other field labor. It is better, therefore, where stones or other material can be conveniently had, to build blind or covered ditches. A very efficient drain can be made by laying suitable stones on the bottom of a ditch leaving an open space between for the water to pass through, then cover it with larger stones, filling up the remaindor of the drain with small ones to within 8, 10 or 12 inches, which may be thrown in, and will fill up the little opening left between the covering stones, preventing ground mice and moles to work ground into the drain; thon the remainder requires to be filled with earth, which will prevent the plow from disturbing the stones and throwing them on top of the ground. If the ground on top of the stones is too shallow, especially when there are few or no small ones on the covers, the plow will turn them up and move them from the ditch, thereby destroying that which was accomplished by a great deal of labor and expense.

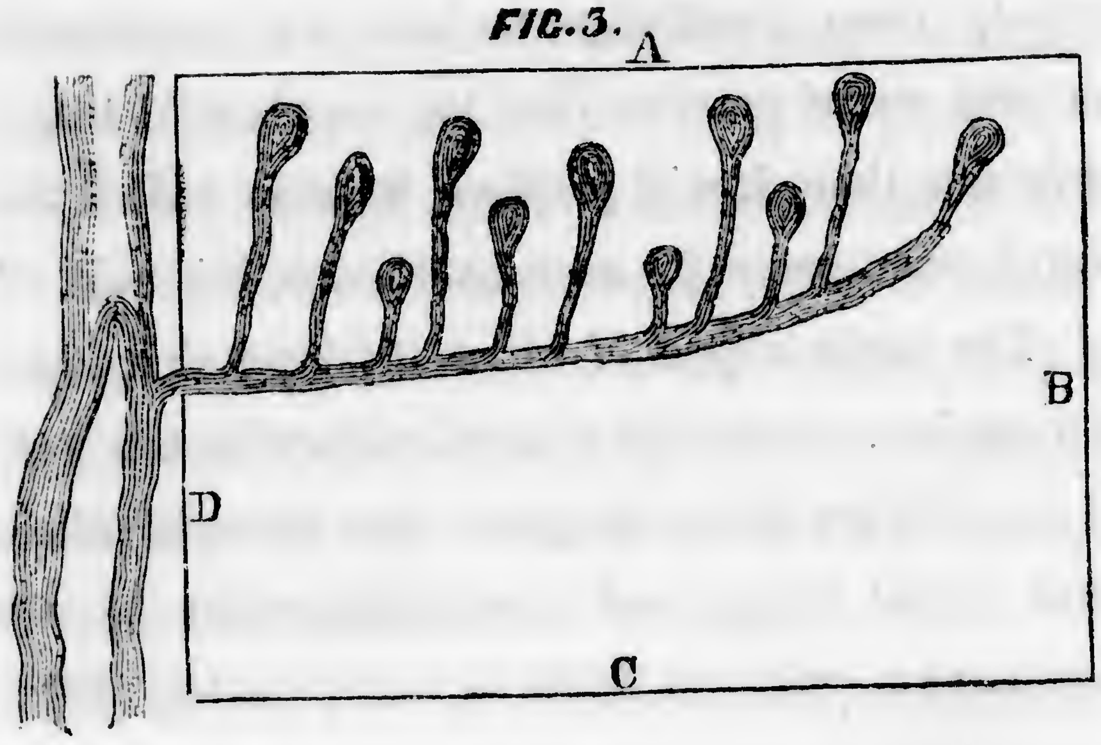
VI. A ditch laid down in clayey soil, ought to be cut through the stratum of clay into the gravelly stratum below, or it is of little benefit; and no ditch for effectual draining ought to be less than 20 inches to 2 feet, and in many cases still deeper, depending on the thickness of strata. It will be found necessary in but few cases, to lay flat stones below in the bottom to prevent the side stones from sinking into the soft mud, and thus render the ditch of little or no value. Ground in some places is however found to be very soft and miry to the depth of 3 or 4 feet below the surface and in such places it will be indispensable to lay flat stones in the bottom of the ditch. I have seen men lay diches from 8 to 12 inches deep, filled up with stones to the top even with the ground; that will answer very poorly, even when the ground is not intended to be cultivated, but merely kept for mowing and pasturing. Wet land producing wild or sour grass, and susceptible of draining, may to advantage be reclaimed so as to bear any kind of our usual crops, and if desired to lay in grass, it is

certainly more profitable to have the cultivated tame and sweet grasses, than the rough, wild trash, and in due time, it will produce what is called the natural green grass, the most nutricious, it is said, of all. The main object of blind ditching or underdraining, is, to bring the ground otherwise too wet, into a condition fit for the plow, and the cultivation of our usual crops, and should therefore by all means have a sufficient depth of earth on top of the stones, to admit the plow to run clear of them at its full depth, otherwise the work is no more than half done, or even not that.

VII. In the first place, then, it is necessary to locate a ditch in its right place, where nature intended it should be, in the second, to make it sufficiently deep for all practical purposes, and in the third, to lay it properly so as not to be disturbed by the cultivation of the soil.

The following diagram represents a field, of 80 perches long, and 60 wide, and the ground too wet and springy for cultivation, and therefore requires draining, if it is to be of any benefit to its owner or cultivator.

FIG. 3.



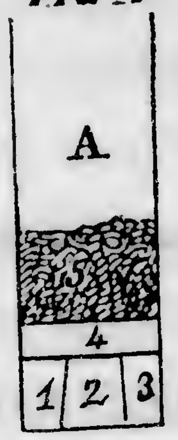
A. is the upper or higher part of the field, B. and D. the short sides, and C. the lower part, towards which the water draws, naturally, when left to have its own free course, and keeps the field unfit for cultivation The engraving represents 11 springs cut off by a blind ditch conveying the water to the left side of the field, and there emptying it into a small stream passing the border of the field.

Thus we have accomplished by one ditch, and a few short branches, what some unexperienced persons would have done by eleven across a field of 30 acres. The field being efficiently drained after the economic plan by less than 175 perches of underdraining ; nature having left that for art to perform;

by implanting the principle in the human intellect.

VIII. Figure 4, represents the face of a blind or covered ditch, two feet deep 18 inches wide (ditches may be more or less according to the size of stones and quantity of water).

FIG 4



Let 2 be the open space for the water to pass through, 1 and 3 the side stones to support the cover stone, 4 and 5 is the space to be filled up with small stones, for the percolation of water and other advantages already mentioned, and A. the 12 inches to be filled up with earth. Thus we have a simple and easy plan laid down for effectually to reclaim wet and valueless lands, and convert them into fertile fields.

The next operation is, deep plowing, the application of a heavy dose of lime, a complete pulverization with a good roller, and a sharp harrow, and the land is ready to produce profitable crops. It may here be proper to state, that if such land is deficient in organic matter, manure may be applied after the lime has been on the ground a month or two, and properly worked in and mixed with it, or the manure may be left for the succeeding year ; (for such lands should be cultivated a few years in succession.) You have then accomplished, what was left undone for centuries for art and science to perform, and you should feel proud to have an opportunity offered you, to prove to the world that you have done what others did not wish to do, or did not understand, and you may properly be called more phylanthropic, or more advanced in the most honorable of all arts, the raising of food and clothing for the millions.

CHAPTER IV.

THE BUILDING OF BLIND DITCHES OF STONES—TILES TIMBER—AND LIMBS OF TREES.

I. This useful farm-improvement is done in different ways, by different farmers, some use stones, while others use tiles, lumber or branches of trees. Economy and efficiency are the main questions that ought to present themselves to the enterprising farmer that is about to commence this improvement of his wet soil, stones, tiles and lumber each have their advocates, and locally considered each is correct.

II. I have made blind ditches with stones only, and consider them of all materials for that purpose the most lasting. Where stones are plenty and require removal to facilitate cultivation, and are not too far to haul, they are beyond a doubt the cheapest article the farmer can make use of in building his covered ditches; accomplishing the double purpose of removing the obstruction occasioned by them, and at the same time applying them to a useful purpose in the reclamation of waste land.

III. Tiles may answer very well where stones are scarce, and far to haul, but where stones are easy of access I question their practicability: taking into consideration their durability and economy which is one of the great principles connected wit agriculture to make it profitable. I have no doub of the superiority of tiles over lumber, and they ar evidently much superior to branches of trees. I they are well burned they will outlast either o these materials and are preferable to them for that reason as well as for efficiency to draw off the water, from the fact that lumber makes too close a work and branches are in a very few years rotten and consequently a relaying will be required, and at all times, when a heavy mass of ground is covered on them, it will either so press them down, that it must be with difficulty that the water will pass through or the ground will so fill up all the spaces not occupied by the branches that it will be little better than no ditch at all. I would prefer an open drain to what is called a brush drain. Having here given my reasons, I will leave the reader to his own choice.

IV. Where stones or tiles are not conveniently to be obtained, my advice is, make ditches with any material that may present itself, rather than cultivate such ground as already described, after the old fashioned drowning process, it will pay well in the end, even if open ditches will have to be depended on, which in fact, in some localities may be preferable to underdrains, all the difference being the inconvenience they offer to the working of the ground and harvesting of the crops, and they may occasionally require cleaning out, which a covered ditch does not, while no caving in takes place, and the little mud that filtrates through a covered drain is readily carried out by the water, an underdrain being its own cleanser.

V. In loan and sand as well as clear clay without stones, a good sharp grubbing-hoe and good steel shovel, are unquestionably the most effective tools that can be used for the excavation of drains. The top, however, can be loosened by a team and plow to much advantage, and will certainly very much expedite the work. When the ditch is a foot deep, it will require either the grubbing-hoe or pick instead of the plow. Where the earth is hard and large bolders are met with, as well as loose native stones, a good pick and crowbar will best supply the place of the grubbinghoe, both for efficiency and durability.

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